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Notes on a Collection of Fishes from Costa Rica[1]

By Samuel F. Hildebrand

DURING the year 1929, Dr. Anatasio Alfaro of the National Museum of Costa Rica sent to the writer several small lots of fishes collected by him in various places in his country. Most of the specimens had been provisionally and generally quite correctly identified by Doctor Alfaro, but it was his desire that the writer study the specimens and identify, or at least verify, the tentative determinations. Doctor Alfaro has given the writer permission to publish such notes on the collection as he may see fit, and to present the specimens to the U. S. National Museum upon completion of the study.

The present list includes a few species that, although not new to science, are new to the fauna of Costa Rica. The range of some of those species already known from that country is extended. Furthermore, the study revealed a few apparently noteworthy facts in regard to the relationship and identity of certain species. It seems worthwhile, therefore, to submit the present paper for publication, as it would appear to add slightly to our rather meager knowledge of the fishes of Costa Rica. The writer wishes to thank Doctor Alfaro for the opportunity which he has provided to make the present study, and Alfred C. Weed of the Field Museum of Natural History, Chicago, for aid in making identifications.

The following is a list of the localities together with the drainage in which they lie, and the elevations at which the collections were made.

Locality	Drainage	Elevation in Meters
Barranca	Pacific	50
Esparta	Pacific	200
Guanacaste (Rio Liberia)	Pacific	150
La Junta	Atlantic	62
Las Palmas	Pacific	100
Liberia	Pacific	150
Miravalles	Pacific	825
Ochomoga	On divide	1530
Ojo de Aqua	Pacific	950
Orotina	Pacific	260
Poza de Ballena	Pacific	50
Puntarenas	Pacific	Near sea-level
Rio Brasil	Pacific	900
San Antonio de Belen	Pacific	920
San Marcos de Tarrazu	Pacific	1423
San Rafeal de Heridia	Pacific	1300
Siquirres	Atlantic	62
Taboga	Pacific	50
Turrialba	Atlantic	625

[1] Published by permission of the U. S. Commissioner of Fisheries.

Characinidae

1. *Astyanax albcolus* Eigenmann

Astyanax albcolus Eigenmann, Bull. Mus. Comp. Zool., 52, 1908: 97 (Rio Machuca and Rio Siquirres, Costa Rica).

Three large specimens from Barranca, respectively 105, 105 and 110 mm. in length, are referred to this species. These specimens are notably deeper and more robust than the other specimens of *Astyanax* in the collection and appear to agree well with the description of the type.

2. *Astyanax fasciatus aeneus* (Günther)

Tetragonopterus aeneus Günther, Proc. Zool. Soc. London, 1860: 319 (Oaxaca, Mexico).

Astyanax aeneus costaricensis Meek, Field Mus. Nat Hist. Pub., (Zool. Ser.) 10, 1914: 105 (Atlantic slope, Costa Rica).

Astyanax fasciatus aeneus Eigenmann, Mem. Mus. Comp. Zool., 43, pt. 3, 1921: 306 (Mexico to Panama).

This variable species is represented by 20 specimens, ranging in length from 52 to 82 mm., collected at Liberia and Siquirres.

3. *Roeboides salvadoris* Hildebrand

Roeboides salvadoris Hildebrand, Bull. U. S. Bur. Fish., 41, 1925: 246, fig. 9 (Rio Sucio at Sitio del Nino, type locality, and Rio Lempa at Suchitoto, also Lakes Guija and Matapan, El Salvador).

Seven specimens 60 to 83 mm. long, collected at Liberia, are at hand. These agree quite well with the ones described from El Salvador under the name here used. The specimens in the present collection all show a diffuse dark spot, on the lateral line near its beginning, which is not mentioned for the El Salvadorian specimens. This species previously was known only from El Salvador, and somewhat doubtfully from western Guatemala.

Pimelodidae

4. *Rhamdia rogersi* (Regan)

Pimelodus rogersi Regan, Ann. and Mag. Nat. Hist., (7) 19, 1907: 259 (Irazu, Costa Rica).

Two specimens, 80 and 175 mm. in length, taken in the Rio Brasil and Turrialba, are at hand. This species is reported by Meek (1914: 103) as being very variable. That author is of the opinion that the species of *Rhamdia* in Central America have been unduly multiplied. Whether or not too many species have been recognized the present writer is not prepared to say. A study of the present and other collections from Central America, however, convinces him that the forms are variable, and that larger collections and a much more intensive study than has yet been given are necessary to definitely define the representatives of the genus. The present

hazy state of our knowledge does not permit of identifications with any degree of certainty. *R. rogersi* is reported from Costa Rica only, having been taken both in the Atlantic and Pacific drainage.

5. *Rhamdia underwoodi* Regan

Rhamdia underwoodi Regan, Biol. Cent.-Amer., Pisces, 1907: 135, pl. 23, fig. 4 (Juan Vinas, Costa Rica).

Three specimens, respectively 165, 165 and 182 mm. in length, collected at San Antonio de Belen, are referred to this species with some doubt. The adipose fin, 3.0 in body length, appears to be rather too long, as does also the humeral process, which extends slightly past the middle of the pectoral spine, to agree with the published accounts. The occipital process is very short, reaching only about 1/4 of the distance from its base to the origin of the dorsal. Head 4.3; depth 6.25 to 6.75 in the length. Eye 5.35 to 6.6; snout 2.35 to 2.6; interorbital 3.0 to 3.3; caudal peduncle 2.3 to 2.55 in head. Dorsal rays I, 6; anal 11 or 12; gill rakers 11. This species is reported from both slopes of Costa Rica and also from the Atlantic drainage of western Panama; but has not been found in the Panama Canal Zone.

6. *Rhamdia nasuta* Meek

Rhamdia nasuta Meek, Field Mus. Pub., (Zool. Ser.) 7, 1909: 207 (Buenos Aires de Terraba, Costa Rica).

The collection contains 9 specimens, ranging in length from 105 to 142 mm., collected at Liberia, Guanacaste and Las Palmas. The occipital process varies in length, but is longer than described for the type: it generally reaches from 1/3 to 1/2 the distance from its base to the origin of the dorsal. The mouth appears to be wider, as the width is contained 1.95 to 2.25 in head. The caudal fin is deeply forked and the lobes are pointed. Head 3.3 to 3.9; depth 4.25 to 5.2; adipose 2.7 to 3.1 in length. Eye 5.8 to 7.3; snout 2.5 to 2.7; interorbital 2.75 to 3.2; caudal peduncle 2.5 to 3.0 in head. This species is known only from Costa Rica, where it is reported from both slopes.

7. *Rhamdia heteracantha* Regan

Rhamdia heteracantha Regan, Biol. Cent.-Amer., Pisces, 1907: 134 (Juan Vinas, Costa Rica).

A single specimen, 100 mm. long, taken at La Poza de Ballena, is referred to this species with some doubt. The occipital process appears to be too long for this species, reaching nearly half the distance from its base to the origin of the dorsal. The anal fin has 12 rays (including undivided anterior rays), whereas only 10 are assigned to the type. Head 3.8; depth 5.45; adipose 2.9 in length. Eye 5.75; snout 2.7; interobital 2.85; caudal peduncle 2.7 in head. This species has previously been reported only from the Atlantic drainage of Costa Rica.

CYPRINODONTIDAE

8. *Rivulus isthmensis* Garman

Rivulus isthmensis Garman, Mem. Mus. Comp. Zool., 19, 1895: 140 (Rio San Jose, Costa Rica).

The collection contains 18 specimens, ranging in length from 35 to 62 mm., collected at Miravalles and at Ochomoga. The anal fin in the specimens at hand appears to have a larger number of rays than has been assigned to this species. Of 17 specimens in which the anal rays were counted 12 have 14 rays, 3 have 13 and 2 have 15 rays. The dorsal fin appears to have 9 rays about as frequently as 10; the scales range from 38 to 42; head 3.6 to 4.0; depth 4.4 to 4.8; eye 3.4 to 3.7; interorbital 2.25 to 3.35; caudal peduncle 1.9 to 2.2; pectoral 1.45 to 1.7.

9. *Oxyzygonectes dovii* (Günther)

Haplochilus dovii Günther, Cat. Fishes Brit. Mus., 6, 1866: 316 (Puntarenas, Costa Rica).

The present collection contains two large males, respectively 155 and 180 mm. long, from the type locality, Puntarenas. This large, well-marked species is recorded only from the lowlands of the Pacific Coast of Costa Rica.

POECILIIDAE

10. *Priapichthys annectens* (Regan)

Gambusia annectens Regan, Ann. and Mag. Nat. Hist., (7) 19, 1907: 259 (Corillo, Juan Vinas and Irazu, Costa Rica).

This variable species is represented by 55 specimens from four localities. Its variations appear to be even greater than indicated by Hubbs (1924: 19-23). The specimens with respect to the number of dorsal rays roughly fall into three groups, as shown by the accompanying table. The

FIN RAY COUNTS AND SOME PROPORTIONAL MEASUREMENTS OF PRIAPICHTHYS ANNECTENS

Locality	Elevation Meters	Dorsal rays 9	10	11	12	Head	Depth (adult females)	Eye
San Rafeal	1300	1	9	—	—	3.33-3.90	3.30-3.75	3.30-3.75
La Junta	62	—	1	5	—	4.00-4.25	3.70-4.00	3.10-3.25
Siquirres	62	—	2	5	—	3.5	3.2	3.10-3.33
Miravalles	825	—	—	5	13	3.40-3.80	3.00-3.45	3.00-3.30

specimens from San Rafeal de Heridia have the lowest number of rays, those from Miravalles the highest; those from La Junta and Siquirres are intermediate. On the basis of the ray counts the specimens from San Rafeal de Heridia should be assigned to *P. annectens hesperis* Hubbs. The specimens from La Junta and Siquirres fall close to typical *P. annectens annectens* as defined by Hubbs (1924: 19-20 and 1926: 52-53). The

specimens from Miravalles may provisionally also be assigned to *P. annectens annectens,* although in this case the average number of dorsal rays is about one-half ray higher than the average given by Hubbs for that race. It should be noted that the counts as I give them are one higher than those given by Hubbs, because I have counted the last two rays as single, and he enumerated them as one double ray.

Head and eye measurements, as shown by the table, and the shape of the mouth and color, other characters used by Hubbs in separating the subspecies, do not appear to support the divisions made on the basis of fin ray counts in the specimens in hand. The tendency of the pigment on the scale pockets to form spots, another character used by Hubbs, is quite variable within a single lot of specimens. For example, some of the specimens from San Rafeal de Heridia, with a low fin ray count, have definite spots and in others the tendency to form spots is not evident. The same may be said of specimens from Miravalles with high fin ray counts. Specimens from La Junta are more slender and more shapely than the others. Their slenderness and the comparatively small size of the head is shown in the table. In these respects the La Junta fish differ so markedly that the proportions scarcely overlap those of the fish from other localities, and they may for the present be considered representatives of a slender race.

This species occurs on both slopes of Costa Rica. It has as yet not been recorded from any other Central American country.

11. *Brachyrhaphis olomina* (Meek)

Priapichthys olomina Meek, Field Mus. Nat. Hist. Pub., (Zool. Ser.) 10, 1914: 114 (Orotina, Costa Rica).

Numerous specimens occur in the present collection. They are fairly uniform in their external anatomy and all agree in having on the base of the anal fin a dark blotch which projects nearly or quite to the tip of the longest rays. Most specimens have dark, quadrate, lateral spots through which narrower vertical bars occasionally extend, especially in the smaller individuals. The quadrate spots are missing in most of the larger females but not in all of them, as in one of our largest examples (46 mm.) they are quite distinct.

This species appears to be very close to *B. rhabdophora,* another Costa Rican form, on one hand, and *B. episcopa* of Panama on the other. *B. rhabdophora* appears to lack the black blotch on the anal fin which is present in *B. olomina. B. episcopa* has the dorsal fin in females inserted a little farther backward, its origin usually falling over the middle of the anal and slightly nearer anterior margin of eye than tip of caudal, whereas in *B. olomina* the dorsal begins over the origin of the anal and is equidistant from the tip of the snout and the end of the caudal. It is quite possible that representatives will be found which will show that these forms all intergrade.

The specimens at hand are from the following localities: Orotina (type locality), Ojo de Agua, Liberia, and Esparta.

12. *Phallichthys pittieri* (Meek)

Poecilia pittieri Meek, Field Mus. Nat. Hist. Pub., (Zool. Ser.) 10, 1912: 71 (La Junta, Costa Rica).

Two lots of specimens from Siquirres, apparently collected at two different elevations (26 and 62 m.), are assigned to this species. The specimens at hand do not appear to have quite as great a body depth as the type and paratype which Mr. Weed of the Field Museum, Chicago, has kindly remeasured for me. However, a similar difference is not found in the depth of the caudal peduncle. It seems probable, therefore, that the types and paratypes may have been preserved either in a gravid condition or with full stomachs. The dorsal fin in the present specimens appears to contain a slightly larger number of rays, but this may be due in part to the method of counting. The present writer in his enumerations has counted the last ray (generally quite well divided to the base) as 2 and he has also counted the first undivided ray. Counted in this way, the number of dorsal rays is 11, whereas only 9 are given for the type. None of the specimens at hand have a black spot above the anal, such as described for the type. Mr. Weed informs me that this spot is present only in the largest females of the type and paratypes and not always equally large and distinct when present. It seems probable, therefore, that this spot is simply an indication of a gravid condition, as in some of the species of this group at least such a spot forms when the female contains large young and it nearly or quite disappears after parturition has taken place. Head 3.65 to 4.2; depth 3.0 to 3.3 in length; eye 3.15 to 3.4; caudal peduncle 1.25 to 1.6 in head; D. 11; A. 8 or 9; scales 26 to 28. The specimens measured are females 38 to 49 mm. in length.

13. *Mollienesia sphenops* (Cuvier and Valenciennes)

Poecilia sphenops Cuvier and Valenciennes, Hist. Nat. Poiss., 18, 1846: 130, pl. 526, fig. 2 (Vera Cruz, Mexico).

This variable species is represented by three color phases in the present collection. One lot taken at San Marcos de Tarrazu consists of very plain specimens, light gray with only a few dark spots on the interradial membranes of the dorsal fin. These specimens have a rather deep body, with a deep, strongly compressed caudal peduncle. Another lot, from Ojo de Agua, is similar in shape and also light in color, but these specimens have very narrow dark cross bars which are present at least on the posterior part of the body. One example from Turrialba agrees with the specimens from Ojo de Agua, except that the dark cross bars are scarcely evident. Specimens from Siquirres are much darker in color than the others, and they are also much more slender; the caudal peduncle especially is more slender and less strongly compressed. Some of the smaller individuals have dark quadrate spots along the middle of the side and also faint, light cross bars.

The present collection, as indicated, shows puzzling variations, and these are multiplied when larger numbers of specimens from a wider range

of localities are examined. Several of the different races or forms have been named but no one has succeeded yet in determining their true relationship.

14. *Alfaro cultratus* (Regan)

Petalosa cultratum Regan, Ann and Mag. Nat. Hist., (8) 2, 1908: 458 (Rio Iroquois, Costa Rica).

The collection contains a fine lot of specimens from Siquirres. The species is known only from the Atlantic drainage of Costa Rica and from Panama near the Costa Rican border. It has not been found on the Canal Zone.

BOTHIDAE

15. *Azevia panamensis* (Steindachner)

Citharichthys panamensis Steindachner, (Sitzb. K. Ak. Wiss. Wein, 52) Ichth. Beitr., 3, 1875: 62 (Panama).

The collection contains a single specimen, 185 mm. long, taken at Puntarenas. This species, although reported from Lower California and Panama Bay, has not been recorded previously from intermediate points.

ATHERINIDAE

16. *Thyrinops pachylepis* (Günther)

Atherinichthys pachylepis Günther, Proc. Zool. Soc. London, 1864: 25 (Panama).

Two specimens of this species, 83 and 103 mm. in length, were collected at Puntarenas.

CENTROPOMIDAE

17. *Centropomus pectinatus* Poey

Centropomus pectinatus Poey, Memorias, 2, 1860: 121 (Havana and Cienfuegos).

Two specimens, 205 and 210 mm. in length, were taken at Taboga. This species, rather widely distributed on both coasts of tropical America, enters fresh water streams freely. The species has been recorded (Meek, 1914: 120) from Jesus Maria and Orotina from the Pacific drainage of Costa Rica.

CICHLIDAE

18. *Cichlasoma alfari* Meek

Cichlasoma alfari Meek, Field Mus. Pub., (Zool. Ser.) 7, 1907: 148 (Turrialba).

A single fine specimen, 170 mm. long, was taken at the type locality.

19. *Cichlasoma dovii* (Günther)

Heros dovii Günther, Proc. Zool. Soc. London, 1864: 154 (Lake Nicaragua).

This species is represented by four specimens, all from the Pacific drainage, two from the Rio Ballena and two from Liberia. It had previously been recorded from Lake Nicaragua and from several localities in the Atlantic drainage of Costa Rica but only from the Rio Higueron in the Pacific drainage (Meek, 1914: 124).

20. *Cichlasoma nigrofasciatum* (Günther)

Heros nigrofasciatus Günther, Trans. Zool. Soc. London, 6, 1868: 452, pl. 74, fig. 3 (Lakes Atitlan and Amatitlan).

This species, originally recorded from Lakes Atitlan and Amatitlan, Guatemala, by Günther, was found there in abundance by Meek (1907: 141 and 1908: 189). It was known only from these mountain lakes of Guatemala, until Hildebrand (1925:273) reported it from El Salvador, having found it common to abundant and quite generally distributed in the lakes and streams of that republic. The writer now has before him several specimens from the Pacific drainage of Costa Rica. This extension of the range makes it appear quite certain that *C. nigrofasciatum* occurs in the Pacific drainage of Nicaragua, although it has not yet been reported from that country.

Doctor Alfaro had noticed that the teeth in the specimens submitted were not entirely round and for that reason had tentatively referred them to the genus *Paranectroplus* Regan. This genus is described as having *compressed teeth with pointed or round apices.* The outer teeth of the specimens in hand are slightly broadened, except at the tips where they are round and pointed, and each tooth has rather sharp lateral edges. In all other respects the specimens appeared to agree with *C. nigrofasciatum* as previously described. Thereupon, several specimens of this species secured in El Salvador by the writer were reexamined. It was found that the teeth in the El Salvadorian specimens also tended to be slightly flattened but to a somewhat smaller degree. Specimens from the type localities, Lakes Atitlan and Amatitlan, Guatemala, were kindly lent for study by the Field Museum of Natural History and these, too, show a tendency toward flattened teeth. The specimens from Costa Rica no doubt are *C. nigrofasciatum,* representing a race or variety with the teeth somewhat more compressed than in the one inhabiting Guatemala and El Salvador.

Meek (1914: 124) has pointed out that the variation in dentition in the cichlids is great, stating, "The species which form the types on which were based the genera *Herichthys, Paranectroplus* and *Tomocichla* have a variable and quite similar dentition, and form a series from the strictly conical teeth of most of the *Cichlasoma* nearly to the strictly compressed teeth of *Nectroplus.* The fact that the species listed under these genera vary so greatly, apparently with age, renders this character of little generic or specific value." Variation with age in the dentition does not seem very evident in the specimens now at hand, but the variation within the species is such that the genus *Paranectroplus* scarcely seems tenable.

The Costa Rican specimens now before me, varying in length from 18 to 100 mm., were all collected on the Pacific slope in the Rio Tempisque drainage at Liberia, in the Rio Ballena, and at Esparta.

Eleotridae

21. *Dormitator latifrons* (Richardson)

Eleotris latifrons Richardson, Voyage "Sulphur," Fishes, 1837: 57, pl. 35, figs. 4 and 5 (probably from Pacific Coast of Central America).

A single specimen of this sluggish-water-inhabiting lowland form, 150 mm. long, taken in Poza de Ballena, is in the present collection. This species is recorded as *D. maculatus* from Jesus Maria and Rio Canas at Taboga, Costa Rica, by Meek (1914: 130). Although largely herbivorous in nature, this fish has been used successfully for mosquito control in such water containers as tanks, barrels, earthenware jars, etc.

Gobiidae

22. *Bathygobius soporator* (Cuvier and Valenciennes)

Gobius soporator Cuvier and Valenciennes, Hist. Nat. Poiss., 12, 1837: 56 (Martinique).

This widely distributed salt and brackish water goby is represented by a single specimen 92 mm. long, taken in an estuary at Puntarenas. It does not appear to have been recorded previously from Costa Rica.

LITERATURE CITED

Behre, Ellinor H.
1928 A list of the fresh water fishes of western Panama between Long. 81°45′ and 83°15′ W. *Ann. Carn. Mus.*, 18: 305-328, pl. 18-19.

Hildebrand, Samuel F.
1925 Fishes of the Republic of El Salvador. *Bull. U. S. Bur. Fish.*, 41: 237-287, 20 fig.

Hubbs, Carl L.
1924 Studies of the fishes of the Order Cyprinodontes, I-IV. *Misc. Publ. Mus. Zool. Univ. Mich.*, No. 13, 31 pp., 4 pl.
1926 Studies of the fishes of the Order Cyprinodontes, VI. *Ibidem*, No. 16, 86 pp., 4 pl.

Meek, Seth E.
1907 Notes on fresh-water fishes from Mexico and Central America. *Field Columbian Mus. Pub.*, (Zool. Ser.) 7: 133-157.
1908 The zoology of Lakes Amatitlan and Atitlan, Guatemala, with special reference to ichthyology. *Ibidem*, 7: 159-206.
1914 An annotated list of fishes known to occur in the fresh waters of Costa Rica. *Field Mus. Nat. Hist. Publ.*, (Zool. Ser.) 10: 101-134.

U. S. Fisheries Biological Station, Beaufort, North Carolina.

A New Name, *Sebastodes pavlenkoi* Wales, Substituted for *Sebastodes ruber* Pavlenko, from Peter the Great Bay

By Joseph H. Wales

M. N. PAVLENKO in 1910 described a new species, *Sebastodes ruber*[1] from the southeast coast of Siberia. The specific name *ruber* has been used by Ayres for an American species of the same genus and has been incorrectly used by other authors for yet another form. Cramer proposed the name *ruberrimus* for the *ruber* of those other than Ayres, and the *ruber* of Ayres has been synonymized with *auriculatus*.

I therefore replace the name *Sebastodes ruber* Pavlenko with the new specific name *Sebastodes* **pavlenkoi,** in honor of the late Russian ichthyologist.

Pavlenko believed this species to be most nearly related to *S. glaucus,* and this seems probable as they both have 14 dorsal spines and other peculiar characters.

I quote the following from the original account of *Sebastodes ruber* Pavlenko.

In my collection there is but one specimen of this interesting fish—from a depth of 812-875 ft.; collected to the south of the Cape of Povorotnovo.

Length 180 mm. Comparing my specimen with the descriptions of Pacific Ocean *Sebastodes* occurring in present literature, I could not identify it with any of these. My specimen possesses many distinguishing characteristics, which lead me to the conclusion that the specimen obtained by me should be listed as a new, hitherto undescribed form. I propose to name it, after its most outstanding characteristic—the reddish color present in the living specimen—*S. ruber.* My form most closely approaches *S. glaucus,* which was described by Hilgendorf for the northern part of the Pacific Ocean, the Japanese Islands, and the Bering Islands.

[English summary] Head 2 7/10 in length; depth 3 3/11; eye 3 in head, 1 in snout; interorbital width 1 1/2 in head. D., XIV, 15; A., III, 10; P., 17; V., I, 5. Lateral line with 40 pores. Highest dorsal spine 2 3/8 in head, thirteenth spine 5 3/13; fourteenth spine 4; second anal spine 2, third anal spine 3; longest soft ray of dorsal 3. Mouth and gill cavity white, peritoneum black. Color reddish in life.

The head of *S. ruber* is large, pressed in from the sides; interorbital space very wide and entirely flat, differing in this from *glaucus,* in which it is convex and much narrower (only 3 2/5 into head). Cranial ridges not developed in a like manner; very strong nasal and parietal; preocular, supraocular and postocular hardly noticeable. Tympanic, coronal and nuchal entirely absent.

Two well-developed spines on the opercle, four on the preopercle, eyes huge (three times into head), strongly jutting out from orbits, which partly shows that this fish is a frequenter of the deeper waters. Jaws, vomer and palatines armed with numerous small, dull teeth, on the order of a rasp. Fins low, lower than in *glaucus;*

[1] Fishes of Peter the Great Bay. Trd. Obsc. Jest., Kazani, 1910: 42.

in the spiny dorsal the fourth is the highest; caudal slightly incised; pectoral goes beyond the anal opening; ventral just reaches it. Body covered with fine ctenoid scales, breast and rays of branchiostegals also covered. Head, opercle and preopercle covered with scales and bearing no furrows or tubeclues as in *glaucus;* jaws entirely uncovered.

Color in life bright red without any signs of spots or bands.
Dredged at station No. 54, 1908.

NATURAL HISTORY MUSEUM, STANFORD UNIVERSITY, CALIFORNIA.

On the Occurrence and Habits of Ocean Sunfish (*Mola mola*) in Monterey Bay, California

By GEORGE S. MYERS and JOSEPH H. WALES

LITTLE seems to have been written of the habits of the ocean sunfish, most general accounts merely stating that the species is pelagic and solitary. It is thus of interest that at Monterey Bay, during the summer of 1929, we frequently observed small ocean sunfish about the rocks near shore.

An oceanic current enters the bay at its southern point and sweeps the shore line towards Monterey, and with this in summer are brought great numbers of jellyfish (*Aurelia*). It appears to be the presence of *Aurelia* which attracts the *Mola,* but of this we are not sure.

Practically all of the specimens observed were from two to three feet in length. They were to be seen on any clear day while fishing for blue perch (*Sebastodes mystinus*) and señorita (*Oxyjulis californica*) in 4 to 8 fathoms, directly off the rocks in front of the Hopkins Marine Station at Pacific Grove. They habitually swam at a depth of a fathom or slightly less and in the clear water were easily observable from the row-boat. The swimming appears to be accomplished almost exclusively by the lateral sculling movements of the dorsal and anal fins, although body movements may assist. The fishes were more active than their ungainly form would seem to permit, easily avoiding oars with which we attempted to touch them. A number of examples were seen to leap into the air, at least one entirely clearing the surface. Often two and at one time three were in sight at once below the boat. None were ever observed swimming at the surface with projecting dorsal.

Whether the sunfishes were present in other parts of the bay in the same abundance cannot be said. Occasional examples were seen disabled and floating on their sides several miles at sea and two such disabled ones were brought into the Hopkins Marine Station. From one a number of *Argulus*-like parasitic crustaceans were removed.

NATURAL HISTORY MUSEUM, STANFORD UNIVERSITY, CALIFORNIA.

The Specific Distinctness of *Poecilichthys coeruleus* (Storer) and *Poecilichthys spectabilis* Agassiz

By Milton B. Trautman

POECILICHTHYS coeruleus (Storer) and *Poecilichthys spectabilis* Agassiz have been considered subspecies, for it has been supposed that the two forms grade insensibly into each other. While on a Fish Survey for the Ohio Division of Conservation, I have had the opportunity of studying these two darters. Under no circumstances did I find them intergrading: both retain their identity under all conditions.

Jordan and Evermann,[1] Osburn,[2] and others have pointed out that *P. spectabilis* inhabits the smaller and more sluggish streams, while *P. coeruleus* lives in the larger, swifter ones, and sometimes occurs in the rivers. The two are found together in Ohio in streams which normally average 10 feet in width. On April 20, 1929, I observed both species spawning in Churn Creek, Adams County, Ohio. The water was very clear and the males of each form were easily recognized by their colors. In no instances were any adult males seen that could not be identified. Approximately one hundred darters of each species were noted in one mile of stream. The males of *coeruleus* could be found guarding their territory and spawning in the deeper, swifter riffles, which had an average depth of 12 inches; while *spectabilis* occupied the shallower, more sluggish riffles with an average depth of 5 inches. Males of *coeruleus* seldom located in the territory occupied by *spectabilis* and *vice versa*. On the other hand, males of each species while pursuing females, were observed invading the other's territory. By July 28, 1929, Churn Creek had diminished in size until it was only a series of pools, connected by a small trickle of water. On that day the same stretch of water was seined as on April 20th. Approximately the same number of *spectabilis* were seen and taken. But none of *coeruleus* could be found: they probably had left for the larger riffles downstream.

In going over the preserved Ohio material of these two species, most of which is in the Ohio State Museum, I was able to separate them consistently. Recently Dr. Carl L. Hubbs and I examined the collections at the Museum of Zoology at Ann Arbor, Michigan, which contained some of Agassiz's cotypes of *P. spectabilis*. This material could also be consistently distinguished.

In *spectabilis* the gill membranes are not united, and meet well forward at an acute angle; while in *coeruleus* these membranes are typically somewhat united across the isthmus. The branchiostegal rays are more pronounced in *spectabilis*, especially in the anterior portion. In *spectabilis* the

[1] Fishes of North and Middle America, 1896: 1089.
[2] Fishes of Ohio, 1901: 100.

distance from the isthmus to the snout is equal to the distance from the snout to the posterior portion of the eye; it is greater in *coeruleus,* in which this measurement usually extends from the snout to half-way between the eye and the occiput.

The greatest depth of body occurs at the shoulders in *spectabilis;* in *coeruleus* it is below the middle of the first dorsal. The prevailing color of the males of *spectabilis* is orange, yellow, light blue and green; in *coeruleus* it is dark blue, dark green, chestnut red, and orange-yellow. The dark bars of *spectabilis* do not encircle the body but form triangular patches along the lateral line, tending to separate the yellow bars into blotches above and below this line. These fade out on the anterior portion of the fish. In *coeruleus* the bars, about fourteen in number, encircle the body, extending from behind the head to the base of the caudal. The brightest breeding males of *coeruleus* have the entire belly and occasionally the breast blue-black. This color does not develop in the other species, in which these regions are orange-yellow. The color pattern of the females and young in each species approaches that of the males. The irregular lines of spots on the upper, anterior portion of the females of *spectabilis* is quite conspicuous, more so ordinarily than in *coeruleus.*

The distribution of the two species is interesting. *P. spectabilis* reaches its eastern limit in the southwestern portion of Ohio and in a few small streams of the Maumee system in the Lake Erie drainage of western Ohio and southeastern Michigan. It appears to be absent from the rest of Michigan, from at least most of Wisconsin, from Ontario and from New York and Pennsylvania. It also occurs throughout Kentucky, presumably in Tennessee, certainly in the North Fork of the Holston River in Virginia. It ranges westward through Indiana and Illinois and Iowa, and is common in Missouri. Its relationship with southwestern forms in Kansas, Oklahoma, Arkansas and Texas remains to be determined.

P. coeruleus ranges from western Pennsylvania and West Virginia, northward to the southern parts of Ontario, Michigan and Wisconsin; southward to Tennessee; westward through the Ohio and upper Mississippi basin. Our knowledge of its limits of range to the southwest and its relationships with the southwestern forms are hazy.

Dr. Hubbs has examined the collections of darters in the Museum of Zoology which were taken at Mallet Creek, near Ann Arbor, Michigan, where Cora Reeves made her detailed studies of the breeding habits of the rainbow darter.[3] He finds both species represented, but *P. spectabilis* much the more numerously. While it is evident that Dr. Reeves' study was based primarily on *P. spectabilis,* her color descriptions and the figure show without question that both species were observed. It appears that she considered *coeruleus* the more developed male.

Division of Conservation, Columbus, Ohio.

[3] Biol. Bull., 14: 35-59.

Notes on the Species of *Cottus* in Western Washington

By Leonard P. Schultz

THE fresh water sculpins or bullheads of western Washington are suitable material for numerous studies in ichthyology, chief of which, perhaps, is an analysis of their variation. This variation was found to be so great between the various stream systems, and even within the same stream, that probably many of the characters used by taxonomists are not valid. A study of the many specimens collected in this region indicates the presence of only four species. The forms described as *Cottus gulosus* (Girard) and *Cottus perplexus* Gilbert and Evermann, are probably not distinct, as Snyder[1] suggested in his study of the fishes of the coastal streams of Oregon, and Northern California.

In our specimens of *C. gulosus* the lateral line is variously incomplete. The pores may cease at any point behind the last third of the soft dorsal, or there may be a complete series. *Cottus perplexus* is reported to have the rays of the soft dorsal extending beyond the base of the caudal fin. We have a complete series of specimens showing that the rays of the soft dorsal fin end any place from over the caudal peduncle to beyond the base of the caudal fin. In fact the dorsal fin on some individuals is often attached to the caudal fin rays by a membrane. The lateral line in the forms in which the soft dorsal rays extend beyond the caudal fin base, varies as in typical specimens of *C. gulosus*. In fact no valid character has been discovered in this preliminary work which will definitely separate the forms known as *C. gulosus* and *C. perplexus*.

Cottus asper Richardson, the most abundant and widely distributed of all, was found in most of the streams and lakes of western Washington in which collections were made. It was taken most commonly in the lower courses of the streams: it abounds in the quieter waters. *Cottus aleuticus* Gilbert was taken likewise in the lower courses of streams and in lakes. It was usually associated with *asper*. *Cottus rhotheus* Smith has been taken in the upper courses of streams, seldom descending below the point where the current was weak. This sculpin occurs farthest up the mountain streams. The author has taken numerous specimens some distance above the Snoqualmie Falls. Even though these have been isolated by the falls for many years, they are not distinct from others taken in nearby streams. *Cottus gulosus* was found associated with *C. rhotheus*, when the latter occurred midway downstream. *Cottus asper* and *C. gulosus* are often found together in the same stream. *C. gulosus* and *C. rhotheus* are typical stream forms, but *C. asper* and *C. aleuticus* are both stream and lake inhabiting species.

[1] J. O. Snyder, "The Fishes of the Coastal Streams of Oregon and Northern California." Bull. U. S. Bur. of Fish., 27, 1907: 185.

It was found that the key to the genus *Cottus,* by Jordan and Evermann[2] was not applicable to the species of this locality. Therefore the following key was made from our studies; it makes use of characters which we have found to be most constant in the region west of the Cascades. It should be noted that Jordan and Evermann give the vertebral formula as 10+23, for the genus *Cottus.* I find two types, in which the caudal vertebrae are usually 22 or 23, and 26 or 27, respectively. Whether the number varies latitudinally in the two types is not definitely known at present, but a study of this point has been started at the Department of Fisheries. The key as presented below has been used by students in ichthyology at the Department of Fisheries, and was observed to work well in their hands.

KEY TO THE SPECIES OF COTTUS IN WESTERN WASHINGTON

1a.—Caudal vertebrae 25 to 29 (usually 26 or 27).[3] Lateral line complete.

2a.—Posterior nostril tubular. No black spot in the membrane at the posterior third of the first dorsal. Soft dorsal with 18 (16 to 20) rays .....*Cottus aleuticus* Gilbert

2b.—Posterior nostril not tubular, normal. A black spot in the posterior third of the first dorsal fin. Soft dorsal with 21 (20 to 23) rays. Body variously prickly .....*Cottus asper* Richardson

1b.—Caudal vertebrae 21 to 24 (usually 22 or 23). Lateral line various, either complete or incomplete.

3a.—Caudal peduncle slender and narrow, rounded, and less than the width of the eye, or about width of eye. Lateral line usually complete, occasionally a few pores (2 to 4) lacking on the caudal peduncle. No definite black spot in the first dorsal fin. Interorbital space concave .....*Cottus rhotheus* Smith

3b.—Caudal peduncle high, compressed, and more than the width of the eye. Lateral line varying greatly, ending any place under the last two thirds of the soft dorsal, or having a complete set of pores to base of the caudal fin. Interorbital not concave, usually flat or a little convex.....*Cottus gulosus* (Girard)

DEPARTMENT OF FISHERIES, UNIVERSITY OF WASHINGTON,
SEATTLE, WASHINGTON.

[2] Jordan and Evermann, "Fishes of Middle and North America." Bull. U. S. Nat. Mus., 47, pt. 2, 1898: 1942-1944.

[3] The first caudal vertebra is the first vertebra which contains a haemal canal. This is easily recognized by the fact that the blood vessel turns abruptly upward as it passes into the canal. This vertebra is the first counted. The last vertebra counted is modified into the hypural plate.

Fish of the Genus *Oreoleuciscus* in Gobi Desert Lakes

By J. T. Nichols

THE interesting genus *Oreoleuciscus* is known from the headwaters of the Ob River, the Altai and Sailughem mountains, and the corner of the Gobi Desert, to the east between these ranges. Material obtained by the American Museum's Central Asiatic Expeditions from Orok Nor, and a small lake north of it, Kholobolchi Nor (1925), and from Tsagan Nor, a little farther east, long. 102° (1922), apparently extends its known range eastward, well out into the desert.

The collector, Walter Granger, tells me that these fish were abundant in Tsagan Nor in the summer of 1922, but in 1925 that lake dried up completely. They were abundant in Kholobolchi in the summer of 1925, swarming into the shallows at its edge with much noisy splashing at night.

The single specimen at hand from Orok Nor is identifiable as *O. pewzowi altus*. A large skull picked up at this same locality, if, as is probable, representing the same form, would be from a fish of about 370 mm. From Kholobolchi we have two of *O. p. altus* and a number of *O. potanini;* from Tsagan Nor, *O. potanini* (to 100 mm. in standard length) and *O. pewzowi pewzowi.*

In all this material the branched rays in dorsal and anal are about one fewer than given by Berg,[1] but this may possibly be due to the individual equation in counting. The three forms are close and variable, but easily separable by Berg's key (*l.c.*). The 21 specimens of *O. potanini* studied, 67 to 169 mm. in standard length, have depth 4.4 to 5.5 (av. 5.2); head 3.5 to 4 (av. 3.8); depth of peduncle in head 2.5 to 3.0 (av. 2.7); lower jaw 2.8 to 3.1 (av. 3.0); branched dorsal rays 7 to 8 (usually 7); branched anal rays 6 to 8 (usually 7). The six specimens of *O. pewzowi pewzowi* studied, 96 to 139 mm. in standard length, have depth 5.5 to 6.3 (av. 5.95); head 3.3 to 3.6 (av. 3.5); depth of peduncle 3.1 to 3.5 (av. 3.3); lower jaw 2.8 (throughout); branched dorsal rays 7 to 8 (usually 7); branched anal rays 6 to 7 (usually 7). The three specimens of *O. pewzowi altus* studied, 174 to 206 mm. in standard length, have depth 4.8 to 5.4 (av. 5.0); head 3.4 to 3.5 (av. 3.5); depth of peduncle 3.0 to 3.5 (av. 3.2); lower jaw 2.7 to 3.0 (av. 2.8); branched dorsal rays 7 to 8 (usually 7); branched anal rays 7. In specimens of 70 mm. and less, the scales are often practically impossible to count, but no scale difference could be found to indicate that *O. humilis* might be present.

The differences which *O. p. pewzowi* show from normal-appearing *O. potanini* are such as one might expect in emaciated individuals of the same fish, but some of these same characters are possessed by *O. p. altus,* which suggests a normal quieter-water form without trace of emaciation.

American Museum of Natural History, New York.

[1] Poissons Eaux Douces Russie, 1916: 140-141.

Sound Production in the Haemulidae

By Martin D. Burkenroad

SMITH (1907) says that the "grunt" of haemulids is produced "by the air-bladder." Gudger (1929) makes the same statement. While at the Carnegie Laboratory at Tortugas in the summer of 1929, the writer had the opportunity of making several observations on grunts, and will here attempt to give a more detailed account of sound production in these fishes than is supplied by the earlier workers. The writer wishes to express his indebtedness to Dr. W. H. Longley, Mr. C. M. Breder, Jr., and Dr. E. S. Hathaway, for their aid.

The "grunt" of *Haemulon plumieri* is a loud rasping croak, given when the fish is in difficulty (possibly also at other times), and produced both under water and in air. Noise-making is not confined to adults, in *H. sciurus* at least, since fishes of this species, down to 30 mm. and possibly smaller, grunt; however, the sound in small fish is very faint.

When an adult of *H. plumieri* is held with the mouth open, the upper and lower pharyngeal teeth can be seen to grate against one another as the "grunt" is produced. On dissection, the upper pharyngeal teeth are seen to be in a broader patch than the lower ones, and to be more freely movable than the latter. On the dorsal surface of the lower part of the fourth pair of gill arches are hard teeth of the same character as those of the pharyngeal patches, so that the total width of the lower tooth-bearing area is equal to the width of the upper pharyngeal patch. In a dissected specimen, when the teeth are in the "grunting position," *i.e.*, closely approximated, the posterior bony edge of the lower pharyngeals is seen to abut against a swelling formed by the anterior end of the swim bladder, which presses against the dorsal wall of the oesophagus. The anterior end of the swim bladder is held in place by several strong tendinous insertions.

If the swim bladder is deflated, the pharyngeals placed in "grunting position," and either patch scraped with a metallic instrument, a dry, grating sound is heard. If the swim bladder is now inflated, and the scratching repeated, the upper pharyngeals continue to produce a dry rasp, but the lower ones produce a deep noise approximating the normal "grunt."

If a cloth is passed between the teeth of a living grunt, so that they cannot scrape together, the fish can make no sound, although it makes the attempt, since the same vibration of the body which accompanies normal "grunting" can be seen. A living *H. plumieri* with the swim bladder deflated by puncture "grunts," but the sound is a dry rasp, and not the normal deeper note.

Hence the "grunt" of *H. plumieri* seems to be produced by the scraping of the upper, more movable pharyngeal teeth against the teeth on the lower pharyngeals and fourth gill arches, while the swim bladder acts as resonator.

The sound-making apparatus in very small *H. sciurus*, in adult *H.*

plumieri, and in the pig-fish (*Orthopristis chrysopterus*) of the Louisiana coast, seems, on dissection, to be identical, so that it is probable that the grunt is produced in the same way in all haemulids.

LITERATURE CITED

SMITH, H. M.
1907 Fishes of North Carolina. *N. C. Geol. and Econ. Surv.,* 2: 209.

GUDGER, E. W.
1929 Teleostean fishes of Tortugas. *Pap. Tortugas Lab. Carn. Inst. Wash.,* 26: 180.

TULANE UNIVERSITY, NEW ORLEANS, LOUISIANA.

A set of Albino Eggs of *Ambystoma microstomum*

By ALVIN R. CAHN

IN Copeia, No. 151, 1926, I reported the finding of two masses of albino eggs of *Hyla* (*Pseudacris*) *triseriata,* gathered near Rantoul, Illinois, on March 25, 1925. It was, therefore, with considerable interest that, on March 22, 1929, I gathered a group of albino egg masses of the salamander *Ambystoma microstomum* from a pond near the Urbana Country Club just north of Urbana, Ill. The pond was loaded with egg masses of this salamander, and I had gathered many when my attention was attracted to a small cluster of eggs that were white, but which showed none of the fuzziness characteristic of fungus-infected or decomposing eggs. In all, six small clusters of these strange eggs were found within an area six feet square, the masses containing 17, 15, 14, 10, 9 and 6 eggs, a total of 71. Examination in the laboratory an hour later showed them to be living eggs that were in an early neural groove stage, that they belonged to *A. microstomum,* and that they were without a trace of pigment. One mass was preserved at once, the remaining being permitted to develop. One mass of albino eggs was raised under normal light conditions, while other masses were placed in absolute darkness and permitted to develop there. Normal controls in a similar stage of development were kept with each set of albino eggs. All hatched on March 27 (water temperature 75° F.), the albino eggs yielding albino larvae. Those raised under the normal light conditions began to develop pigment rather rapidly and just before hatching, while those kept in the dark developed pigment much more slowly, the light raised albinos being, in fact, about intermediate between the normal controls and the dark-raised albinos. Specimens of all groups were preserved from time to time for study, and such study is

now under way. This difference between light and dark raised albino *A. microstomum* larvae is in direct contradiction with the results of similar experiments by the writer on the albino *Hyla triseriata* eggs raised under identical conditions, as reported in the aforementioned paper. The albino *H. triseriata* larvae developed pigment of equal intensity irrespective of the light conditions; the albino *A. microstomum* larvae developed approximately 50 per cent less pigment in the dark as compared with identical larvae in the light. Larvae raised in the dark and then transferred to the light rapidly caught up with the light-raised albinos, but none approached normal pigmentation. As these were the only albino eggs in the pond, among hundreds of normal egg masses, it would seem probable that they were all deposited by a single female. Whether this albinism is genetic, or merely a result of a physical defect in the female is unknown, but the question raises a problem the solution of which would be interesting. Incidentally, in view of these two finds of albino eggs, the writer is wondering whether albino amphibian eggs may not be more common than one would suppose, and he would suggest that collectors of amphibian eggs examine carefully "dead" white egg masses which they often see, and make certain that they are really dead and not albinistic.

University of Illinois, Urbana, Illinois

Some Additional Notes on Melanism in *Thamnophis s. sirtalis* in Ontario

By E. B. S. Logier

In Copeia, No. 172, I published some figures on the relative numbers of black and normally coloured young in the broods of garter snakes from Long Point, Norfolk County, Ontario. The figures mentioned above were obtained from the litters of five females, three normally coloured and two black, collected at Long Point while I was there with the Museum party in 1927. They showed that out of a total of 102 young born 57 or 55.88 per cent. were black.

In July, 1929, I again visited Long Point, this time in company with Mr. W. J. LeRay of the Department of Biology, of the University of Toronto. We stayed on the Point for two days and decided to collect while there every garter snake we saw, without regard to colouration or size. A number, of course, escaped, but we secured a total of 86 out of which 44 or 51.6 per cent. were black. This high figure of more than fifty per cent. of melanistic specimens in our collection is possibly greater than naturally occurs in the garter snake population of the Point, and is perhaps due to the fact that their colour does not conceal them in the field; they are more easily seen and followed up, and so less likely to escape than are the striped specimens.

These garter snakes were brought to Toronto alive and ten pregnant females were selected and isolated in separate bags until after their litters were born. The figures for these ten broods are as follows:

Young of six normally coloured females—
Aug. 15—Normally coloured 19, black 8
Aug. 15—Normally coloured 20, black 6
Aug. 15—Normally coloured 49, black 31 (two broods)
Aug. 19—Normally coloured 32, black 0
Aug. 21—Normally coloured 13, black 14 (a rather dark female)

133	59

Young of four black females—
Sept. 3—Normally coloured 21, black 13
Sept. 3—Normally coloured 2, black 10
Sept. 3—Normally coloured 20, black 4
Sept. 11—Normally coloured 1, black 13

44	40

Totals: Normal..... 177 black 99

It will be seen from these figures that out of 192 young born of six normal females, 59 or 30.7 per cent. were black, and out of 84 young born of four black females, 40 or 47.61 per cent. were black. Out of the total of 276 young born of these ten females, 99 or 35.86 per cent. were black, a much lower percentage than in the 1927 broods.

Royal Ontario Museum of Zoology, Toronto, Canada.

Ichthyological Notes

STRAND'S NEW FISH NAMES.—In a recent paper,[1] Strand proposes as new fish names *Cantharusa* and *Carlana*. Now *Cantharusa* Strand is a useless and entirely unnecessary synonym of *Spondyliosoma* Cantor,[2] which was proposed to replace *Cantharus* Cuvier, 1817, as Cuvier's name is preoccupied by *Cantharus* Bolten 1798. *Carlana* Strand is also a replacement, for *Carlia* Meek 1914, which is preoccupied by the name *Carlia* Gray 1845. The Keuper fossil belonorhynchid *Saurichthys tenuistriatus* Kner 1867 is also renamed *Saurichthys scefeldensis* Strand, as Kner's name is precluded by *Saurichthys tenuistriatus* Münster 1848. Attention is directed not only to these names, but to others, as Strand has included the whole animal kingdom in his desperate assault on the misfortune of preoccupied names.—HENRY W. FOWLER, *Academy of Natural Sciences, Philadelphia, Pennsylvania.*

NOTE ON THE CONGO SHARK, *LEPTOCHARIAS SMITHII* (MÜLLER AND HENLE).—*Mustelus osborni* Fowler was described[3] from the mouth of the Congo, and was based on a specimen 752 mm. long. Owing to *Triaenodon smithii* Müller and Henle[4] usually having been ascribed to South Africa, I overlooked a comparison. Though Müller and Henle also failed to show the conspicuous long labial folds, this comparison would likely have prevented me from proposing *Mustelus osborni* as a new species. *Mustelus osborni* Fowler falls a synonym to the little known *Leptacharias smithii* (Müller and Henle).—HENRY W. FOWLER, *Academy of Natural Sciences, Philadelphia, Pennsylvania.*

Herpetological Notes

CARETTA KEMPII FROM MASSACHUSETTS.—The bastard turtle, *Caretta kempii* (Garman), was not included in "The Turtles of New England."[5] In Garman's original description he states that this species is found in the Gulf of Mexico. Hay[6] later reported it from Atlantic City, N. J. A label in the Reptile Hall of the American Museum of Natural History reads: "It is perhaps most common in New York harbor where it often greatly outnumbers the other sea turtles." A specimen recently came to light in the collection of the Boston Society of Natural History which seems to belong to this species. It is No. 1215, taken off Swampscott, Mass., on October 10, 1905. Collector Dr. S. J. Mixter. Donor Dr. Thomas Barbour.

Inasmuch as all of the other sea turtles inhabiting the Atlantic occasionally reach New England shores, it is not surprising to find C. kempii here also.—HAROLD L. BABCOCK, *Boston Society Natural History, Boston, Massachusetts.*

[1] Archiv Naturg., Abth. 8, Heft 8, 1926: 54.
[2] Journ. Asiatic Soc. Bengal, 18, 1849: 1032.
[3] Am. Mus. Nov., No. 103, November 31, 1923: 1.
[4] Beschr. Plagiostomen, 1841: 56, pl. 21. Kabenda Bay.
[5] Mem. Boston Soc. Nat. Hist., 8, No. 3, 1919.
[6] Proc. U. S. Nat. Mus., 34., 1908: 183.

EDITORIAL NOTES AND NEWS

The Journal

WITH this number, COPEIA appears in a new size and format. The editors hope that the members of the Society and the contributors to the journal will be pleased with the changes. The expense of publication has been increased, and the Society will have to grow in order to support the journal as now published. The editors have faith in the future of the Society. We ask that all the members make an effort to enlarge the Society.

Owing to the transfer of editorship, it has been necessary to send to press the manuscripts on hand, which are mostly ichthyological. It is the intention of the editors to balance the ichthyological and herpetological contributions.

After several years of generous service to the Society, as Editor and Treasurer, Dr. E. R. Dunn has resigned from these positions. To fill the vacancies until the next meeting of the Society, the President has selected the Secretary as Ichthyological Editor, Mrs. Helen T. Gaige as Herpetological Editor, and Professor T. L. Hankinson as Treasurer.

The 1929 Meeting

NO notice has appeared in COPEIA concerning the twelfth meeting of the Society, held at the Museum of Zoology of the University of Michigan, on April 9 and 10, 1929. Twenty-five members attended. A feature of the meeting was an exhibition of twelve series of paintings and photographs of the cold-blooded vertebrates. The exhibitors were Stephen Haweis, New York Aquarium, American Museum, C. H. Townsend, T. E. B. Pope, L. M. Klauber, L. W. Brownell, M. Graham Netting, Museum of Zoology, Frank N. Blanchard, S. C. Bishop and Myron Gordon. Mr. Gordon also exhibited some aquarium fishes.

Twenty-five papers were presented at this meeting:

1. Notes on the genus **Kentropix**. A. G. Ruthven, **University of Michigan.**
2. The systematic status and breeding habit of **Eupemphix trinitatis** Boulenger. M. Graham Netting, **Carnegie Museum.**
3. Porto Rican fishes in relation to the West Indian fauna in general. J. T. Nichols, **American Museum of Natural History.**
4. A summary of a revision of the genus **Pituophis**. Olive Griffith Stull, **University of Michigan.**
5. Remarks on the genus **Coluber**. L. C. Stuart, **University of Michigan.**
6. The pigmentation of regenerated scales in certain genera of cyprinids. T. H. Langlois, **Michigan Department of Conservation.**
7. Structural changes in whitefishes induced by environmental factors. Walter **Koelz, University of Michigan.**
8. Breeding behavior of the silverfin minnow, **Notropis whipplii spilopterus**. T. L. Hankinson, **Michigan State Normal College.**
9. Hydrobiological survey of the western end of Lake Erie. E. L. Wickliff, **Ohio Department of Agriculture, Division of Fish and Game.**
10. Field studies of some common salamanders. S. C. Bishop, **University of Rochester.**
11. The stimulus to breeding migration of the spotted salamander. Frank N. Blanchard, **University of Michigan.**
12. The mating and hybridization of distinct genera of sunfishes in an aquarium. Carl L. Hubbs and Laura C. Hubbs, **University of Michigan.**
13. Generic crosses in killifishes and the hereditary behavior of the fertile hybrids. Myron Gordon, **New York State College of Agriculture.**
14. The life history of the copperhead. Howard K. Gloyd, **Kansas State Agricultural College.**

15. The status of **Natrix transversa** Hallowell. Edward H. Taylor, **Dyche Museum, University of Kansas.**
16. The discovery of a remarkable new type of mudminnow in western Washington. Leonard P. Schultz, **University of Washington.**
17. New fish records for Ohio. Milton Trautman, **Ohio State Museum,** and E. L. Wickliff, **Ohio Department of Agriculture, Division of Fish and Game.**
18. Preliminary report on the growth of the cisco, **Leucichthys artedi,** in some Wisconsin lakes. Stillman Wright, **United States Bureau of Fisheries.**
19. The food of trout in Michigan. Jan Metzelaar, **Michigan Department of Conservation.**
20. The relative importance of hydrogen-ion concentration, temperature and dissolved oxygen on habitat selection by brook trout. C. W. Creaser, **College of the City of Detroit.**
21. Scientific investigation of the Great Lakes fisheries. John Van Oosten, **United States Bureau of Fisheries.**
22. The food of **Necturus maculosus.** Wm. J. Hamilton, Jr., **Cornell University.**
23. Preliminary resume of the life histories of the species of **Stizostedion.** Hilary J. Deason, **United States Bureau of Fisheries.**
24. Frogs and herpetologists of Australia. Frank N. Blanchard, **University of Michigan.**
25. Notes on **Syrrhophus hylaeformis.** Helen T. Gaige, **University of Michigan.**

Dr. G. K. Noble gave an informal talk on the work being carried on in his experimental laboratory at the American Museum.

The Secretary reported that the Society had made substantial growth during the year, and urged that further efforts be made to enlarge the organization. He recommended that the petition of western members for the formation of a Western Division be approved. This was done.

The officers of the previous year were re-elected.

Meetings of the Western Division

THE organization meeting of the Western Division was held at the University of California on June 20, 1929. Five members and three guests attended. The Division was established, and an executive committee formed. It was agreed that the annual meetings be held with the Pacific Division of the American Association for the Advancement of Science. The following officers were elected: President, John O. Snyder; Vice-President, Rolf L. Bolin; Secretary-Treasurer, George S. Myers; all of Stanford University, California.

The second Western meeting was held in the Hopkins Marine Station, at Pacific Grove, California, on December 20, 1929. Ten members and ten guests were present. The Section associated itself with the American Association for the Advancement of Science. A program of five papers was presented:

1. South Sea Notes. Dr. Albert W. Herre, **Stanford University.**
2. A herpetological collecting trip to western Texas, with exhibition of living **Elaphe bairdii.** G. M. Kranzthor, **Hopkins Marine Station.**
3. Notes on the range and life history of the Pacific fresh-water turtle, **Clemmys marmorata.** Dr. Tracy I. Storer (read by Secretary).
4. Notes on the California Oligocottinae, with exhibition of living specimens. Rolf L. Bolin, **Hopkins Marine Station.**
5. A note on the value of song study in investigation of relationships among frogs and toads. George S. Myers, **Stanford University.**

The New York Meeting

THE thirteenth meeting of the Society will be held at the American Museum, New York, on May 20 and 21, 1930. The arrangements for this meeting are in the hands of a local committee, consisting of William K. Gregory and G. K. Noble of the American Museum, and C. M. Breder, Jr., of the New York Aquarium. It is hoped that a large attendance and an interesting program will mark this meeting as one of the most successful in the history of the Society.

Jan Metzelaar 1891-1929

TO America, as a land of promise and opportunity, Dr. Jan Metzelaar came in November of 1923. Almost immediately he entered upon his duties as Fisheries Expert for the Michigan Department of Conservation, and this work he carried on with tremendous enthusiasm until the hour of his death. His headquarters were maintained in the Division of Fishes of the Museum of Zoology, where he served also as Custodian of Michigan Fishes.

JAN METZELAAR

Metzelaar became fondly attached to this land he had adopted, and was made supremely happy at being admitted as a citizen of the United States on October 2, 1929. Just two days later he was drowned in Grand Lake, near Alpena, Michigan. He died in action, while carrying on his fishery investigations. Thus, before the end of his thirty-eighth year, Jan Metzelaar joined that heroic band of martyrs to science.

This man, whose life was so tragically cut short, was born at Slushing, in the Netherlands, on October 21, 1891, and he received his education in his native land. He was thoroughly trained in biology by Max Weber and other professors at the University of Amsterdam. The doctorate degree, conferred in 1919, was granted on a thesis treating the systematics of Tropical Atlantic fishes, especially those of the Dutch West Indies. He published also a shorter paper on West Indian fishes, and also one on locomotion as related to caudal fin form in fishes. His ichthyological endeavors included also the preparation of a check-list of East African Marine fishes, but this has as yet not been published. Before receiving his degree, Dr. Metzelaar accepted an educational position in the fisheries service of the Dutch Government, and during this work prepared a popular booklet on the Dutch fishing grounds, and also a note on animal commensalism. He then frequently went to sea, as far as Iceland, and rounded off his training in practical fisheries investigation.

Metzelaar's interests in general biology were early illustrated by his translation into the Dutch of Lamarck's *Philosophie Zoologique*. He also carried on many experiments in the genetics of pigeons, and published several papers on this subject.

A fuller account of the life of Jan Metzelaar, and a bibliography of his published writings, has been published in the Annual Report of the Museum of oZology of the University of Michigan, for 1928-1929.

Recent Deaths

THE Society records with regret the death on January 5 of Dr. Herbert J. Pack, Entomologist of the Utah Experiment Station. Dr. Pack was best known herpetologically for his work upon the food habits of Utah lizards.

Another member has been lost to the Society by death: Captain C. F. Silvester of the Army Medical Museum, known for his studies on Porto Rican fishes.

We learn from *Science* of the recent death of Professor Kamakichi Kishinouye, the eminent Japanese ichthyologist, and of Dr. Benedikt Dybowsky, who when exiled in Siberia made important studies on the cold-blooded vertebrates of that country. Doctor Kishinouye died in China, while collecting freshwater fishes.

Stephen Alfred Forbes, veteran and pioneer economic zoologist, well known for his splendid work on the ecology, distribution and food of Illinois fishes, died on March 13.

The death of John N. Cobb, Dean of the College of Fisheries of the University of Washington, is announced as COPEIA is in press.